

WHAT IS CLAIMED IS:

1. An optical scanning apparatus comprising entrance optical means for guiding light emitted from light source means, to deflecting means, and scanning optical means for focusing the light reflectively deflected by the deflecting means, on a surface to be scanned,

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10 wherein the scanning optical means comprises a plurality of sagittal asymmetric change surfaces in which curvatures in the sagittal direction change on an asymmetric basis in the meridional direction with respect to the optical axis of the scanning optical means.



15 2. The optical scanning apparatus according to Claim 1, wherein said sagittal asymmetric change surfaces comprise two or more sagittal modification surfaces in which magnitude relation differs among curvatures in the sagittal direction at respective 20 positions in the meridional direction with respect to the optical axis.

25 3. The optical scanning apparatus according to Claim 2, wherein said sagittal deformation surfaces comprise two or more surfaces in which the curvatures in the sagittal direction at the respective positions in the meridional direction with respect to the optical axis become large or small on the same side.

4. The optical scanning apparatus according to  
Claim 2, wherein in at least one surface of said  
sagittal deformation surfaces the curvatures in the  
sagittal direction become large on the side of said  
5 light source means with respect to the optical axis.

5. The optical scanning apparatus according to  
Claim 1, wherein in at least one surface of said  
sagittal asymmetric change surfaces the curvatures in  
10 the sagittal direction have an inflection point only on  
one side in the meridional direction with respect to  
the optical axis.

6. The optical scanning apparatus according to  
15 Claim 1, wherein said scanning optical means comprises  
a plurality of  $f\theta$  lenses, an  $f\theta$  lens located closest to  
the deflecting means out of said plurality of  $f\theta$  lenses  
has a negative, refractive power in the sub-scanning  
direction, and an  $f\theta$  lens located closest to the  
20 surface to be scanned has a positive, refractive power  
in the sub-scanning direction.

7. The optical scanning apparatus according to  
Claim 6, wherein all lens surfaces of said plurality of  
25  $f\theta$  lenses are formed in a concave shape opposed to said  
deflecting means.

8. The optical scanning apparatus according to

Claim 1, wherein the following condition is satisfied:

$$k/W \leq 0.6$$

where k is an  $f\theta$  coefficient of said scanning optical means and W an effective scanning width on said surface to be scanned.

9. The optical scanning apparatus according to

Claim 1, wherein the following condition is satisfied:

$$|\beta_s| \geq 2$$

where  $\beta_s$  is a lateral magnification in the sub-scanning direction of said scanning optical means.

10. A multi-beam optical scanning apparatus comprising light source means having a plurality of light-emitting regions, entrance optical means for guiding a plurality of beams emitted from the light source means, to deflecting means, and scanning optical means for focusing the plurality of beams reflectively deflected by the deflecting means, on a surface to be scanned,

wherein said scanning optical means comprises a plurality of sagittal asymmetric change surfaces in which curvatures in the sagittal direction change on an asymmetric basis in the meridional direction with respect to the optical axis of the scanning optical means.

11. The multi-beam optical scanning apparatus

according to Claim 10, wherein said sagittal asymmetric change surfaces comprise two or more sagittal modification surfaces in which magnitude relation differs among curvatures in the sagittal direction at 5 respective positions in the meridional direction with respect to the optical axis.

12. The multi-beam optical scanning apparatus according to Claim 11, wherein said sagittal deformation surfaces comprise two or more surfaces in which the curvatures in the sagittal direction at the 10 respective positions in the meridional direction with respect to the optical axis become large or small on the same side.

15 13. The multi-beam optical scanning apparatus according to Claim 11, wherein in at least one surface of said sagittal deformation surfaces the curvatures in the sagittal direction become large on the side of said 20 light source means with respect to the optical axis.

14. The multi-beam optical scanning apparatus according to Claim 10, wherein in at least one surface of said sagittal asymmetric change surfaces the 25 curvatures in the sagittal direction have an inflection point only on one side in the meridional direction with respect to the optical axis.

15. The multi-beam optical scanning apparatus according to Claim 10, wherein said scanning optical means comprises a plurality of  $f\theta$  lenses, an  $f\theta$  lens located closest to the deflecting means out of said plurality of  $f\theta$  lenses has a negative, refractive power in the sub-scanning direction, and an  $f\theta$  lens located closest to the surface to be scanned has a positive, refractive power in the sub-scanning direction.

10        16. The multi-beam optical scanning apparatus according to Claim 15, wherein all lens surfaces of said plurality of  $f\theta$  lenses are formed in a concave shape opposed to said deflecting means.

15        17. The multi-beam optical scanning apparatus according to Claim 10, wherein the following condition is satisfied:

$$k/W \leq 0.6$$

20        where  $k$  is an  $f\theta$  coefficient of said scanning optical means and  $W$  an effective scanning width on said surface to be scanned.

25        18. The multi-beam optical scanning apparatus according to Claim 10, wherein the following condition is satisfied:

$$|\beta_s| \geq 2$$

where  $\beta_s$  is a lateral magnification in the sub-scanning direction of said scanning optical means.

19. An image-forming apparatus comprising the scanning optical apparatus as set forth in either one of Claims 1 to 18, a photosensitive body located at said surface to be scanned, a developing unit for 5 developing an electrostatic, latent image formed on said photosensitive body with the light under scan by said scanning optical apparatus, into a toner image, a transfer unit for transferring said developed toner image onto a transfer medium, and a fixing unit for 10 fixing the transferred toner image on the transfer medium.

20. An image-forming apparatus comprising the scanning optical apparatus as set forth in either one 15 of Claims 1 to 18, and a printer controller for converting code data supplied from an external device, into an image signal and supplying the image signal to said scanning optical apparatus.

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